

Correlation Between Clinical And Morphological Changes In Cases Of Ectopia Vesica Treated By Ileal Graft

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Abstract

Introduction : Ectopia vesica is the most severe of the commoner congenital malformations of the urinary system where the urinary bladder lumen is exposed and urine incontinence is present. Treatment has taxed the skill of surgeons for over hundred years and intestinal segments are still the classical graft used for treatment of the condition. aim of work : The aim of this study was determined to evaluate the ileal tissue used in repair of urinary bladder defects and its mucosal morphological changes in the wall at different intervals after surgery in human cases aiming to correlate them with their clinical condition. Subjects and methods :Cystoscopy guided biopsy specimens from the ileal grafts of five male children (mean age 8 years ,range 5-10 years) who had undergone bladder repair using ileal wall were assessed by light microscopy from 1month to 2 years after operation. The morphology was compared with control specimens from the same tissue at the time of repair. Results : Light microscopy showed decrease in goblet cells, and marked congestion in the wall associated with inflammatory cell reaction. These early microscopic changes were gradually disappeared and the absorptive and secretory mucosa of the ileum was gradually changed into protective mucosa with multilayer epithelium. In conclusion :The mucosa of the ileum adapted well to the new environment as a urinary neobladder, and the microscopic changes explained the associated clinical signs and symptoms after surgery including the early hematuria, massive exfoliated cells and mucus excretion.

Introduction

Intestinal segments are frequently used in the reconstruction of the urinary tract in patients with bladder defects, in patients undergoing radical cystectomy and other diseases Philipson *et al.* (1986). Replacement with a new tissue has become an important procedure Pruthi and Wallen (2007). Ureterosigmoidostomy was the classical treatment of ectopia vesica since the time of Maydl (1894) The wall of the ileum was used by many surgeons. Obara *et al.* (2006). The intestinal function recovers within 72 hours after operation ,and the urethral catheter is removed within two weeks after surgery and the results of intravenous urography is normal at 3-month,1-year, and 2- year follow up after surgery Xia *et al.* (2007). The ileal neobladder provides better continence than the sigmoid neobladder. Kato *et al.* (2007). However, hematuria, pyuria, enteroreservoir fistulas, daytime continence, night-

time continence and urinary retention are reported complications with cases of bladder repair .However, the proportions of patients positive for urinary culture, pyuria, bacteriuria and chronic inflammation was more frequently observed in patients with ileal neobladder than the sigmoid neobladder. Nakano *et al.* (2007) .The mucosa of the ileum used as a conduit or reservoir for urine undergoes progressive villous atrophy and loss of microvilli and carries the function in examined cases Tonno *et al.* (1997) , Kato *et al.* (2007) .

Subjects And Methods

The mucosal structure of the ileum was studied in ten male children (5-10 years age) who had undergone repair of congenital ectopic bladder using ileal grafts. Mucosal biopsies of the ileal tissue were taken via a cystoscope in Al-Hussein

university hospital during admission and during follow up along two years at separate intervals. Cystoscopic specimens 2-3 millimeters thick from the edges of the implanted ileum were routinely fixed in buffered formol/saline, embedded in paraffin, and cut at 6 μ m thick and stained with Heamatoxylin and eosin, PAS and Masson Trichrome. Informed consents for the children were obtained from their parents. Full investigations were done before selection of cases. Patients with metabolic complications including serum electrolyte abnormalities and metabolic acidosis were excluded.

Results

Results were gained from cystoscopic specimens of five patients. Other patients were not subjected for the regular follow up. There were marked morphological changes in the ileal mucosa exposed to urine. Early in the first weeks after surgery there was minimal histological change in the wall of the ileal graft (fig.1&2). The next six months after surgery there was advanced edema and inflammation

appeared as increased mucoal and submucosal thickness and inflammatory cell infiltration in all cases extended down to the muscle layer (fig.3,5&13). Other changes consisted of marked congestion in the blood vessels (fig.3), extensive infiltration of the mucosal layer by inflammatory cells (fig.7), and marked decrease in goblet cells number and function (Table 1, fig.15, 16, 17, &18). By the end of the year after operation mucosal atrophy with sloughing of villi (fig.4), followed by atrophy of the crypts where pyknosis of nuclei and vacillation of cytoplasm was prominent (fig.11&12). Disappearance of goblet cells and creeping of the surface epithelial cells to cover the atrophied epithelium was observed (fig.6&9). Results of PAS stain showed the gradual decrease in number and secretion of goblet cells(fig.15,16,17,&18). After two years later the surface epithelium was formed of crowded epithelial cells or modified stratified epithelium (fig.8,9&10), disappearance of submucosal capillary congestion decrease in inflammatory cell infiltration and keeping the normal architecture of the tissue.

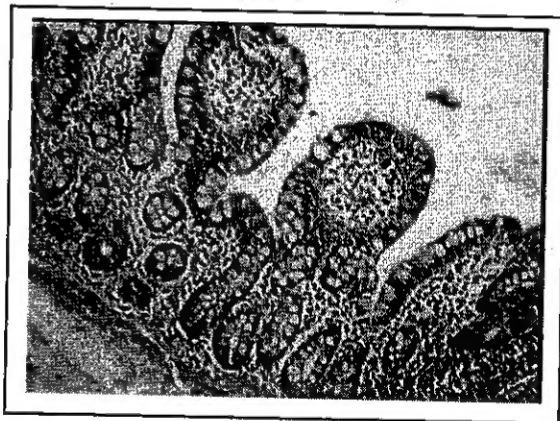


Fig. (1):- Section in the ileum at the beginning of the operation showing normal villi and crypts with immune cells in the wall. Hx &E X250

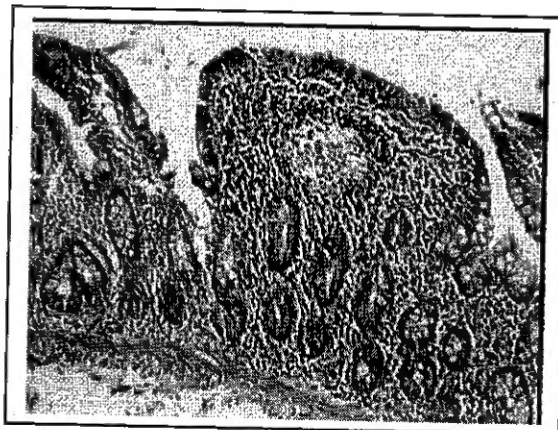


Fig. (2) :- Section in the ileum two weeks after operation showing normal villi and crypts with more cellular infiltration Hx &E X250



Fig. (3) :- Section in the ileum one month after operation showing marked congestion of blood vessels in the submucosa and sloughing of the villi on the mucosal surface Hx &E X250

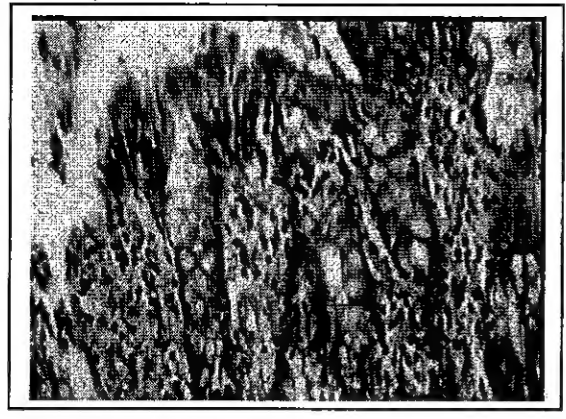


Fig. (4) :- Section in the ileum one month after operation showing sloughing of the villi and persistence of the crypts Hx &E X400

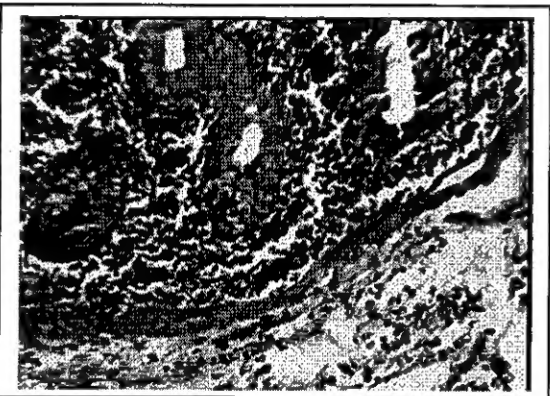


Fig. (5) :- Section in the ileum one month after operation showing marked cellular infiltration in the mucosal layer and inbetween collagen fibers of the submucosa. Masson trichrome X400

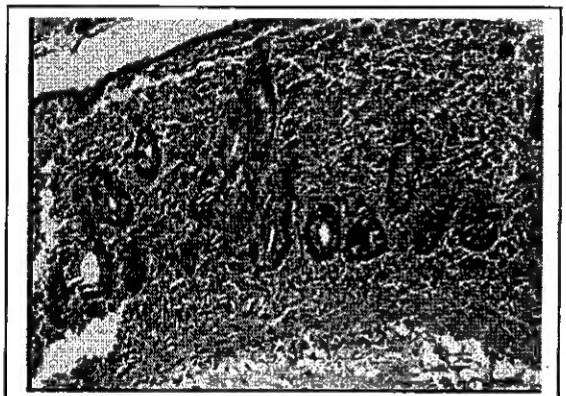


Fig. (6) :- Section in the ileum ten months after operation showing Complete sloughing and persistence of crypts only Hx &E X250

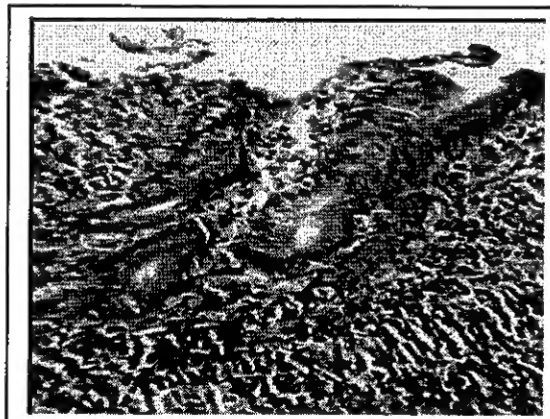


Fig. (7) :- Section in the ileum six months after operation showing Sloughing of the villi and persisting of the crypts Hx &E X400

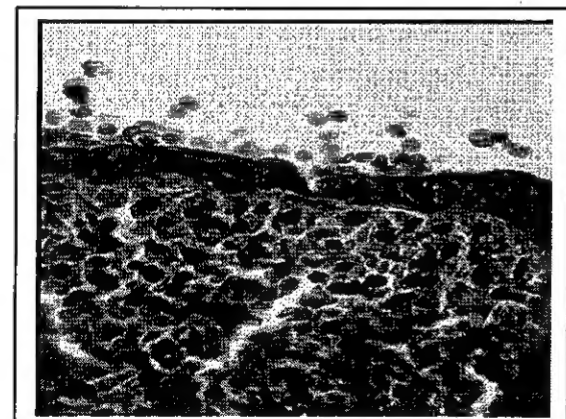


Fig. (8) :- Section in the ileum ten months after operation showing Creeping of the epithelium to cover the raw area Hx &E X1000

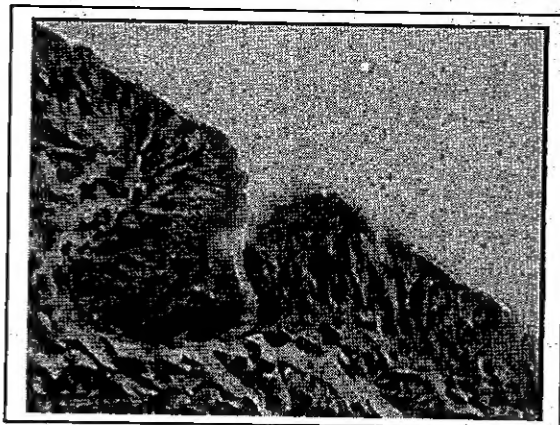


Fig. (9) :- Section in the ileum two years after operation showing Creeping of surface columnar cells to cover the wall Hx &E X1000



Fig. (10) :- Section in the ileum six months after operation showing Creeping of surface columnar cells to cover the wall Hx &E X1000

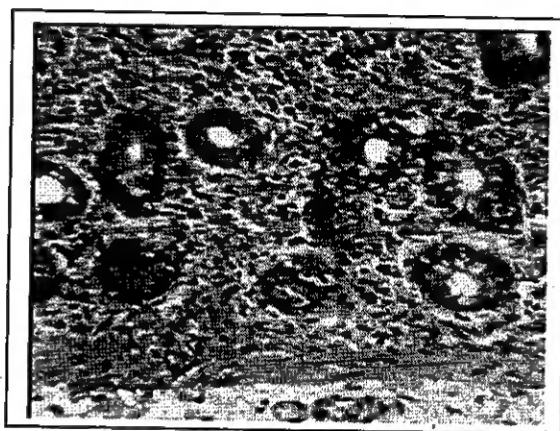


Fig. (11) :- Section in the ileum four months after operation showing Inflammatory cell infiltration between the crypts of the mucosal layer. Hx &E X400

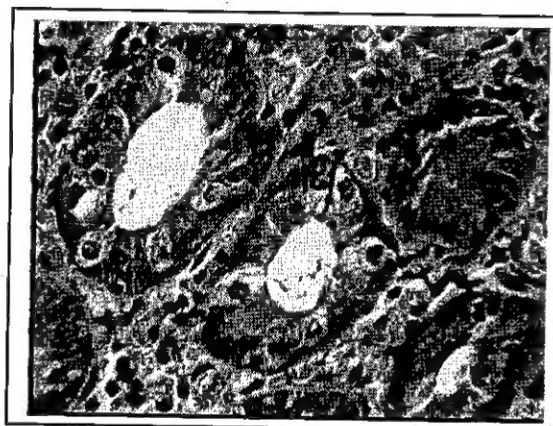


Fig. (12) :- Section in the ileum ten months after operation showing persistence of crypts only. Cells lining the crypts show pyknotic nuclei indicating degeneration. Hx &E X1000

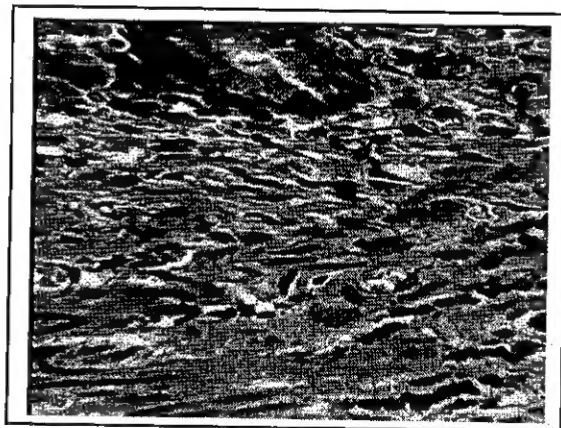


Fig. (13) :- Section in the ileum six months after operation showing Inflammatory cell infiltration between the smooth muscles Hx &E X1000

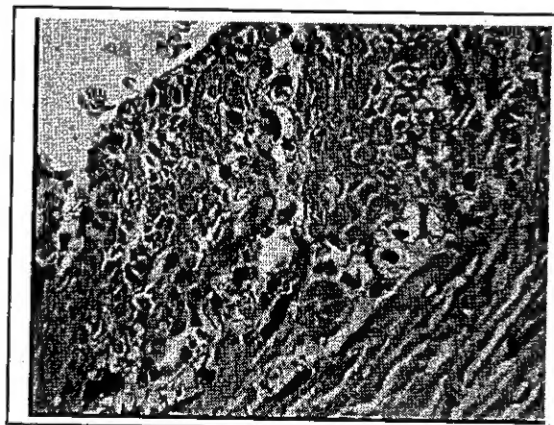


Fig. (14) :- Section in the ileum 12 months after operation showing Decrease of Inflammatory cell infiltration between the smooth muscles Hx &E X1000



Fig. (15) :- Section in the ileum one month after operation showing Normal goblet cells with marked goblet cell secretion. PAS stain X 1000

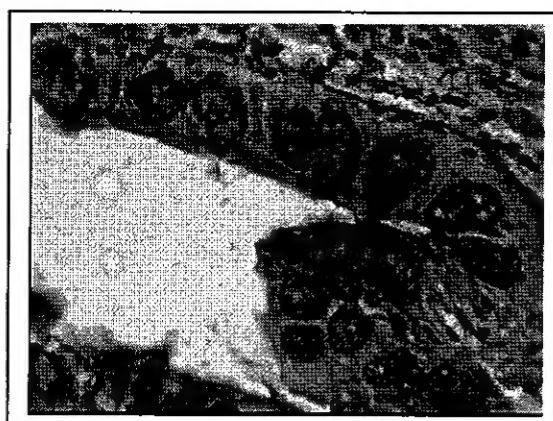


Fig. (16) :- Section in the ileum six months after operation showing Gradual decrease in goblet cells PAS stain X 1000

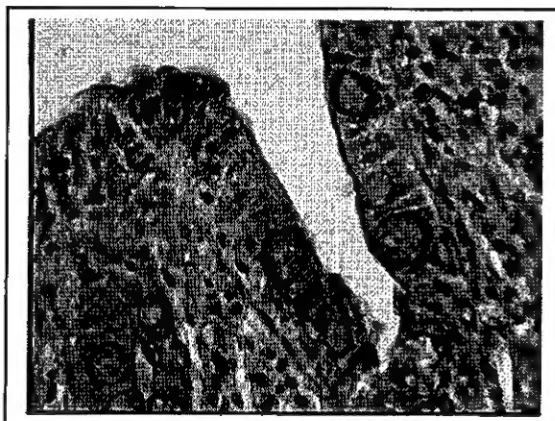


Fig. (17) :- Section in the ileum ten months after operation showing Gradual decrease in goblet cells PAS stain X 400

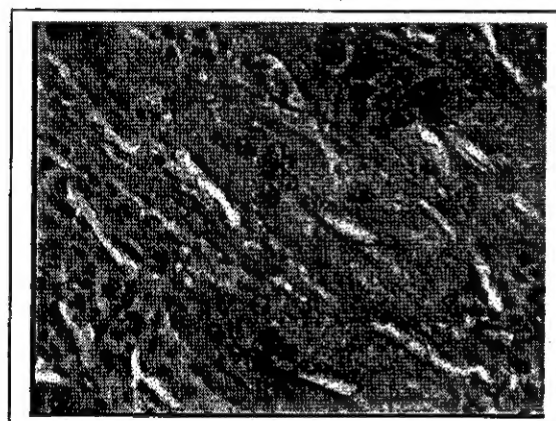


Fig. (18) :- Section in the ileum 12 months after operation showing Decrease in goblet cell number and secretion PAS stain X 400

Table (1): The mean optical density values (O.D.V.) of PAS positive materials and the mean Goblet cell number (G.C.N.) in the epithelial cells of the ileal grafts at different intervals after operation.

DURATION	1 month	6 months	12 months
MEAN (O.D.V.)	0.863553	0.43678	0.077324
MEAN (G. C. N.)	755	291	033

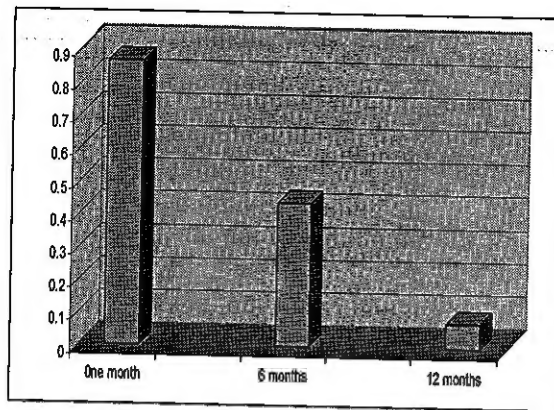


Fig. (19): Histogram showing the relation between the mean optical density values of PAS positive materials in the epithelial cells of the ileal grafts at different intervals after operation.

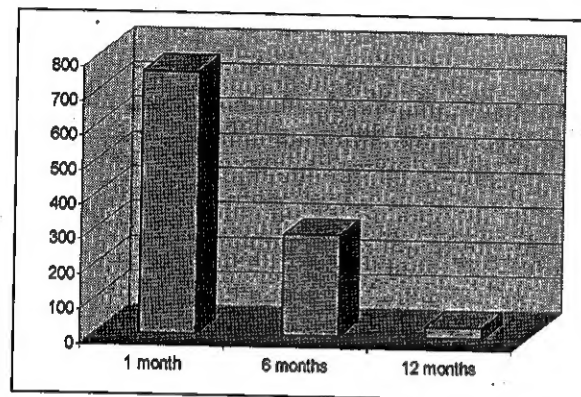


Fig. (20): Histogram showing the relation between the mean Goblet cell number (G.C.N.) in the epithelial cells of the ileal grafts at different intervals after operation.

Discussion

The transplanted ileum showed significant histological changes after construction. The most prominent changes being in the luminal part of the wall however the muscle was also affected Harano *et al.* (2007). The effect of chronic urinary exposure on the morphology and transport function of intestinal segments needs follow up of cases for years Leblond . (1965) and Dean *et al.* (1984). Unlike the intestinal contents which stimulate the immune cell migration to the intestinal wall the urinary tract mucosa lacks the inflammatory cell aggregation in the healthy state and urine contents are will accommodated by the urinary mucosal cells ,Guerrero *et al.* (1970). According to Nurse and Mundy (1989) and Abreu *et al.* (2005) the chemical nature of urine is the apparent cause of odema, congestion and hematuria and other changes resulted in the mucosa of

ileal grafts in all operated patients and seemed to be the main cause of the inflammatory cell reaction. However, the histological changes remains minimal at early weeks in ileal grafts, therefore, according to Curlen *et al.* (1990), Harano *et al.* (2007), and Kato *et al.* (2007) there must be a normal balance between cell production and cell loss in early graft. The newly formed cells arising from mitosis in the ileal epithelium migrate to the surface and on death they are lost into the lumen resulting into atrophy of the ileal villi, Garner *et al.* (1975)., therefore the juvenile cells are seen in the basal region of the crypts, while senile cells are seen at the tip of the crypts Goldstein *et al.* (1967). This corresponds to the massive exfoliated epithelial cells present during the course of the treatment, however, the cell turnover of the mucosa of the ileum changes with time

and this mitosis is gradually modified to produce new resistant cells rather than goblet cells. The gradual decrease in goblet cells seen in PAS stained tissue explained the excreted many discarded cells as well as mucus from the ileal graft with urine after surgery along the clinical course. The decreasing Goblet cell number with time was noticed in the early massive sloughing of villi and in the late massive pyknosis of nuclei in crypts, Hall *et al.* (1993). The morphological changes was advantageous in that they account for the clinically observed low incidence of metabolic alterations in the followed up cases and these changes showed that the mucosa of the ileum adapted well to the new environment as a urinary neobladder, Hautmann *et al.* (2006). However, this new technique is in need of further evaluation studies.

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العلاقة بين التغيرات المورفولوجية والاكلينيكية في حالات المثانة المكشوفة المعالجة باستخدام رقعة من جدار اللفائفي

السيد جلال خضر - عبد الهادي سماحة

قسمى الهستولوجيا وجراحة الاطفال بكلية الطب جامعة الازهر

اجرى هذا البحث لمتابعة التغيرات الهستولوجية التي تحدث للطبقة المخاطية في جدار الامعاء عند استخدامها كجزء تكميلي جديد لجدار المثانة في الحالات التي تستوجب ذلك وقد اجري هذا البحث على عينات من جدار المثانة الجديد لعشرة اولاد من الذكور المصابين بحالات عيوب المثانة المكشوفة خلقيا منذ الولادة تراوحت اعمارهم من خمس الى عشر سنوات حيث اجريت لهم جراحة ترقيع لجدار المثانة بجزء من اللفائفي بقسم جراحة الاطفال بمستشفى الحسين الجامعي التابعة لجامعة الازهر وقد اخذت عينات لم يزد سمكها على ثلاثة ملليمترات من جدار رقعة اللفائفي بمنظار المثانة الجراحي المناسب تحت الظروف الطبية المقتنة و بعد موافقة كتابية من أسر المصابين. وبعد متابعة الحالات متابعة تامة تم استبعاد الحالات المصحوبة بمضاعفات مابعد الجراحة او تغيرات في نتائج الفحوص العملية الكيميائية وقد تم اخذ العينات بالمستشفى سواء اثناء فترة الجراحة وبعد الخروج اثناء المتابعة على فترات متباعدة وصلت الى عامين من عدد كبير من الحالات قدر الامكان حيث تعذر حضور بعض الحالات. وقد تم اعداد العينات هستولوجيا و صبغها بصبغات الهيماتوكسيلين والايوسين وماسون الثلاثية والباص و فحصها بالميكروسكوب الضوئي وتصويرها وتحليل الصور كيميا باستخدام برنامج محلل الصور بالحاسوب وقد وجد اظهرت النتائج ضمورا في زغب اللفائفي حيث نقص طولها وذلك في الاسبوع الاول بعد اجراء الترقيع تلى ذلك وجود التهاب شديد وتورما بالانسجة في جدار المثانة الجديد ظهر تحت المجهر في صورة تمدد شديد في جدار الاوعية الدموية مع احتقانها الدموي وذلك في الشهر الاول ثم امتلا النسيج بخلايا الالتهاب بالاضافة الى ضمور الخلايا الكاسية ونقص عددها وافرازها تدريجيا وذلك في خلال الشهور الستة الاولى اما قى العينات التي اخذت بعد مرور سنة من الجراحة لوحظ هدوء حدة الالتهاب وقلة عدد الخلايا الليمفاوية قى النسيج بينما اخذت الخلايا الكاسية في الاختفاء تدريجيا وحل محلها خلايا سطحية عديدة الطبقات للحماية. وقد اظهرت النتائج نجاح عملية ترقيع جدار المثانة بجزء من جدار اللفائفي وينصح باجراء المزيد من الابحاث على هذه التقنية من الجراحات لاتساع استخدامها في الونة الاخيرة ولمعرفة المزيد عن تاقلم النسيج المعوي مع الوسط الجديد.